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SERVICE Counselor

PACKARD MOTOR CAR COMPANY

VOL. 24, NO. 12 DECEMBER, 1950

Mechanical Specifications and Adjustments

24th Series—300-2413

BRAKES

Type	Hydraulic 2-shoe
Effective area	292.25 sq. in.
Effective area hand brake	162.25 sq. in
Drum diameter—front	12" centrifuse
—rear	14" centrifuse
Lining size and material	
Primary—Marshall 9051	
—front	2½" x ⅛" x 13"
—rear	2¾" x ¼" x 14¾"
Secondary—Marshall 9032	
—front	2½" x ⅛" x 13"
—rear	2¾" x ¼" x 14¾"
Wheel cylinder size	
—front	1⅜" Dia.
—rear	1¼" Dia.
Master cylinder size	1⅜" Dia.

CLUTCH

Type	Single dry plate
Pedal free play	1¼" to 1½"
Facing material	U.S. asbestos woven
Size facing	7" x 10½" x .125"
Throw-out bearing	Prelubricated ball
Clutch spring pressure	163 lb. at 1.562"
Number of springs	9
Vibration neutralizer	Yes

COOLING SYSTEM

Type	Pressure
Water pump	Centrifugal—self adjusting
Water pump drive	Fan belt
Capacity of system	20 qts.
Fan	4 blade 18"
Driving pulley	On crankshaft
Ratio	.919 to 1
Thermostat starts to open—	
Standard	148° to 156°
High reading	157° to 165°
	175° to 184°
Fan belt	41.2" x .375"
Heat indicator	Electric
Fan belt adjustment	At generator
Gravity flow of radiator	39½ gal. per min.
Radiator cap	Pressure type—7 lb. per sq. in.

ELECTRICAL

Battery make	Auto-Lite 2FH-120
	Willard HW-2F-120
Capacity	120 Amp. Hr.
Plates	17
Ignition timing	6° BTDC
Breaker point gap	.0125"—.0175"
Breaker arm spring tension	19-23 ozs.
Spark control	Full automatic
Spark advance begins at	600 engine RPM
Distributor—vacuum controlled	Auto-Lite IGP-4502C
	Delco 1110825
Spark plug—size	14 MM
Spark plug—make and type	Auto-Lite A5; AC-46-5;
	Champion J8
Spark plug gap	.026"—.030"
Generator make and type	Auto-Lite GGW-6003A
	Delco 1102745
Generator drive	Belt
Generator cut-in speed—cold	920 RPM Auto-Lite
	900 RPM Delco
Generator output—maximum	40 Amps.
Generator voltage—maximum	7.4 volts
Generator voltage regulator	Auto-Lite VRP-4402C
	Delco 1118360
Generator voltage to close cut-out	6½ to 7 volts
Starter motor—make and type	Auto-Lite—MCL-6113
	Delco-1107943
Starter drive	Bendix shift
Number of flywheel teeth	140
Number of teeth in starter pinion	9
Pinion meshes	From front
Head, tail and stop-light current protection	Thermostatic circuit breaker
Directional signal	Yes
Clock fuse	SFE 3 amperes
Overdrive fuse	SFE 30 amperes
Directional signal current protection	Thermostatic circuit breaker
Radio fuse	SFE 14 amperes
Headlight bulb—sealed beam	45-35 watt
Horn—make	Sparks-Withington
Horn—location	Radiator cradle support
	(Between core and grille)
Battery terminal grounded	Positive
Ampere draw of horns	22-25 amperes
Ampere draw of headlights (each)	7-5.5 amperes
Ampere draw of coil—idling cold	2.75 amperes
Clock—type and make	Electric—Borg
Starter stall torque	Auto-Lite—25 ft. lb.
	4 volts—875 amperes
	Delco—16 ft. lb.
	3 volts—600 amperes
Igniiton coil	Auto-Lite CR-4001A
	Delco 1115376

ENGINE

Make	Packard
Type	L-head—vertical
A.M.A. horsepower	39.2
Maximum brake horsepower—Std. comp.	150 @ 3600 RPM
—High comp.	155 @ 3600 RPM
Suspension	Rubber mounted
Firing order	1-6-2-5-8-3-7-4
Torque—Std. comp.	270 ft. lbs. @ 2000 RPM
—High comp.	275 ft. lbs. @ 2000 RPM
Bore	3 1/16"
Stroke	4 1/4"
Piston displacement	327 cu. in.
Cylinders	8 in line
Compression ratio—standard	7.00 to 1
—high	7.80 to 1
Weight with clutch and transmission	875 lbs.
Weight with overdrive	910 lbs.
Weight with Ultramatic drive	1010 lbs.
Cylinder head material	Cast iron
Engine rev. per mile—std. ratio	3086 Std. Trans.
	2310 with O. D.
	2963 with Ultramatic

CONNECTING ROD

Weight	2 lbs. 3.4 ozs.
Material	Steel forging
Bearing type	Detachable shell
Center to center length	7 31/32"
Length of crank pin	1 3/16"
Clearance bearing to crankpin	.0005"—.0025"
End play on crankshaft	.003"—.011"
Oil lead to piston pin	Rifle drilled
Bearing material	Special composite construction
Assembled in engine	Oil hole toward camshaft
Bearing adjustment	Replace bearing shells

CRANKSHAFT

Type	Counterbalanced
Material	Steel forging
Number of counterweights	8 forged integral
Number of main bearings	5
Main bearing journal diameter	2.7465"
Connecting rod journal diameter	2.250"
Main bearing length No. 1	1 3/16"
Main bearing Length No. 2	1 1/16"
Main bearing length No. 3	1 33/64"
Main bearing length No. 4	1 1/16"
Main bearing length No. 5	2 1/16"
Projected main bearing area	19.3 sq. in.
Thrust taken on	Center
Vibration damper	Fluid suspension
Weight	103 1/2 lbs.
End play	.0035"—.0085"
Main bearing material	Special composite construction
Clearance—all main bearings	.001"—.003"
Crankshaft sprocket—material and size	Steel 21-teeth
Bearing adjustment	Replace bearing shells

FRONT END

Gear cover	Steel stamping
Camshaft drive	Silent chain
Make of chain	Morse
Length, width and pitch of chain	58 links: 1": .375"
Number of camshaft bearings	5
Clearance of camshaft bearings	.001"—.003"
Camshaft end play	.004"—.006"
Camshaft sprocket—material and size	Cast iron—42 teeth hardened

OILING SYSTEM

Type	Full pressure
Oil pump type	Gear
Crankcase capacity	7 qts.
Oil filler location	Left side
Oil filter location	Left side
Oil measuring stick	Left crankcase
Oil pump intake	Floating screen
Crankcase ventilator	Yes
Oil pressure—normal driving	40 lbs.
Oil drain	Hex head flange plug 3/8"—18

PISTON

Type and material	Auto-Thermic alum alloy
Weight	19 1/2 ozs.
Weight with rings, pin and locks	25 1/2 ozs.
Overall height	3 3/4"
Height centerline of pin to top	2 3/8"
Skirt clearance	.0005"—.001"
Assemble slot toward	Camshaft
Piston pin—size	3 7/8" x 3/8"
Type	Floating
Lubrication of pin	Pressure
Piston pin fit in piston	Palm push at 160° F. in water
Piston pin fit in rod	Finger push fit
Piston pin oversizes	.003"—.006"
Number of rings per piston	3
Number of compression rings	2
Number of oil rings	1
Width of compression rings	.0930"—.0935"
Width of oil rings	.1860"—.1865"
Piston ring gap—compression	.007"—.017"
Piston ring gap—oil	.007"—.015"
Location of rings	Above pin
Piston oil drain holes	12-5/32" dia. holes
Piston oversizes	.005", .020", .030", .040"

VALVES

Valve lift—intake and exhaust	.342"
Valve arrangement	L head
Valve head diameter—inlet	1 47/64"
—exhaust	1 1/16"
Valve stem diameter—inlet	.3417"
—exhaust	.3398"
Valve over-all length	5 3/8"
Valve material—inlet	Chrome nickel
—exhaust	Austenitic
Valve spring keeper type	Split cone
Valve stem clearance—inlet	.002"
—exhaust	.004"
Valve tappet clearance	Automatic take-up
Inlet valve opens	15° BTDC
Inlet valve closes	43° ALDC
Exhaust valve opens	53° BLDC
Exhaust valve closes	4° ATDC
Tappet clearance for timing inlet	Not used
Tapper clearance for timing exhaust	Not used
Valve seat angle—inlet	30°
—exhaust	45°
Valve spring	Single
Valve spring load—valve closed	60-66 lbs. @ 1 3/4"
—valve open	135-145 lbs. @ 1 47/64"
Exhaust pipe diameter	2 3/4"
Muffler size	5 1/16" dia x 35 3/8"

FRAME

Depth (Maximum)	6"
Thickness (Maximum)	1/4"
Flange (Maximum)	2 1/16"

FRONT SUSPENSION

Make	Packard
Type	Independent parallelogram
Steering knuckle	Reverse Elliot
Steering knuckle pin bearings	
Upper and lower	1.063" x 1.1875" x 1.250" O.D.
Thrust bearings	Steel ball bearing
Caster	Neg. 2°—plus or minus 1/2°
Front wheel toe-in	0—plus 1/8 minus 0
Knuckle pin angle	2°30'
Camber	0°—plus or minus 1/2°
Wheel bearings—inner and outer	Tapered roller
Wheel bearing adjustment	Tighten inner nut to 20 ft. lbs. and back off 2 to 3 holes on locking washer and lock.
Tread	59 1/2"

GASOLINE SYSTEM

Carburetor—Make and type	Carter WGD—7675 Down draft 1¼" duplex
Gasoline feed	Mechanical pump
Pump drive	Off camshaft
Gasoline filter	Incorporated in fuel pump
Gasoline gauge	Electric
Gasoline tank capacity	20 gal.
Air cleaner and silencer	Oil bath standard equipped
Carburetor heat control	Thermostatic
Automatic choke	Thermostatically controlled
Carburetor fuel level	⅛" below top of bowl

REAR AXLE

Type	Semi-floating
Make	Packard
Final drive	Hypoid gears
Propulsion	Through rear springs
Axle housing	Pressed steel banjo type
Oil capacity	6 pts.
Wheel bearings	Tapered roller
Tread	65 ⅛"
Gear ratio—Standard transmission (11-50)	4.54 to 1
—Overdrive (10-47)	4.7 to 1
—Ultramatic (11-48)	4.36 to 1
Pinion backlash	.003"—.005"
Oil drain plugs	½"—14 pipe thread
Universal joints	Mechanics-roller bearing type
Number required	3—double shaft

SPRINGS

Front—Coil	2700 x 172
Rear—Leaf	"Left" 2100 x 225 "Right" 2000 x 225
Front size	4¼" inside diameter
Rear length and width	54⅝" x 2"
Shackles	Rubber mounted
Shock absorbers	Hydraulic direct-acting (1⅜" diameter)
Stabilizer—front and rear	Torsional
Spring material—front and rear	Silico-manganese

STEERING GEAR

Make	Packard-Gemmer
Type	Worm and 3-tooth roller
Ratio—overall	30.9
—gear	22.3
Steering wheel	18"—2 spokes
Minimum turning radius	28 ft.

TRANSMISSION

Type—Standard	Selective—Silent Synchronized	
Type—Automatic	Ultramatic	
Number of forward speeds—Std. Trans.	3	
Engine to rear wheel ratio	Std.	O.D.
Overdrive		3.39
Direct	4.54	4.7
Second	6.94	7.18
First	11.05	11.41
Reverse	14.36	
Oil capacity—std. trans.	2 pints	
Oil capacity—O.D. unit	1¼ pints	
Oil capacity—Ultramatic	12 qts.	
Oil level plugs—Std. and O.D.	½"—14 pipe	
Oil level indicator—Ultramatic	Dip stick on filler cap left side of case	

WHEELS

Type	Demountable disc (16" x 5½" "F" Rim)
Size of tire	16 x 7.50—6 ply
Recommended tire pressure (cold)	
—front	30 lbs.
—rear	40 lbs.

CAR DIMENSIONS

Wheelbase	156"
Overall length—bumper to bumper	251 ⅜" (less rear guards)

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Indicator and Gauge Testing

24th Series

The battery discharge and oil pressure indicators and the water temperature and gasoline gauges on all 24th Series models are electrically operated.

The battery discharge indicator is a telltale light which lights up when more electrical energy is being used than is being delivered to the battery.

The oil pressure indicator also is a telltale light which operates in conjunction with a sending unit in the cylinder block. This indicator sometimes will light up or will flicker when the engine is idling even though the idle oil pressure is adequate; however, the light should go out when the engine is speeded up.

The water temperature and gasoline gauges operate in conjunction with a constant voltage regulator, attached to the back of the instrument cluster, and sending units in the cylinder head and gasoline tank.

If the battery discharge indicator shows a constant discharge when it normally should show a charge, the battery, regulator, generator, wiring, etc. should be checked to determine the cause.

If the indicator does not light at any time, the bulb should be replaced. The indicator always should light up when the ignition switch is turned on before starting the engine and also when the ignition key is turned to the left.

The oil pressure indicator should light up when the ignition key is turned. If it does not light, disconnect the wire from the sending unit and ground the wire to the frame or cylinder block. If the indicator still does not light up with the ignition switch on, replace the bulb.

If the indicator lights up when the wire is grounded to the frame or block, the sending unit should be checked for being loose and poorly ground. If the unit is found to be tight and properly grounded, it should be removed and a new unit installed.

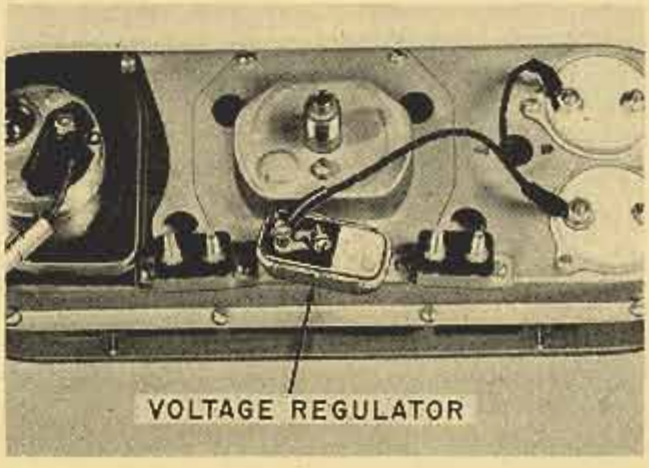

Fig. 1

If the indicator remains lit when it normally should be out, replace the sending unit before proceeding further to determine the cause for a low pressure indication.

The voltage regulator (figure 1) is common to both the temperature and the fuel level systems. The regulator operates at a constant average value of 5.0 volts.

If both the temperature gauge and the fuel gauge read considerably too high at the same time—that is, if the temperature gauge reads up scale with a cold engine and the gas gauge reads up scale with an empty tank, the voltage regulator is not working properly and should be replaced.

Note—Before replacing a regulator, check the regulator retaining screws for being tight so that the regulator is properly grounded. The grounding is essential to the proper functioning of the unit.

If the temperature gauge and the fuel gauge both read too low at the same time, either the input voltage to the regulator is below 5.0 volts or the regulator is not operating properly and should be replaced. Check the battery output voltage before replacing the regulator.

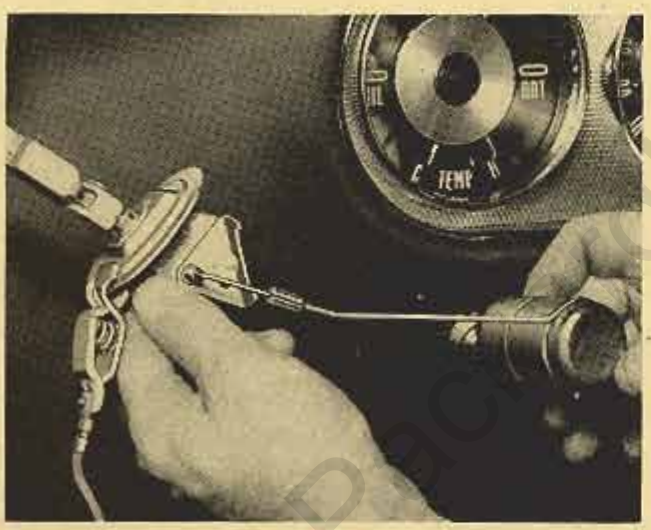

Fig. 2

A definite check to determine if the regulator is defective is to disconnect the wires from the regulator terminals and attach them to a new unit out of stock. Ground the new unit against the instrument cluster case at which time the gauges should operate properly.

A new fuel tank sending unit out of stock and two test leads with clip terminals at each end may be used to determine whether a temperature or a fuel gauge and their respective sending units are operating properly. Test leads approximately 10 feet long will permit the individual making the check to sit in the seat of the car and observe the gauge being checked.

To check the water temperature gauge, disconnect the wire from the terminal on the sending unit in the cylinder head and clip one end of a test lead to the disconnected wire. Clip the other end of the test lead to the terminal on the new tank unit. Clip one end of the second test lead to the flange on the tank unit and ground the other end of the lead. Turn on the ignition switch and operate the float arm of the new tank unit.

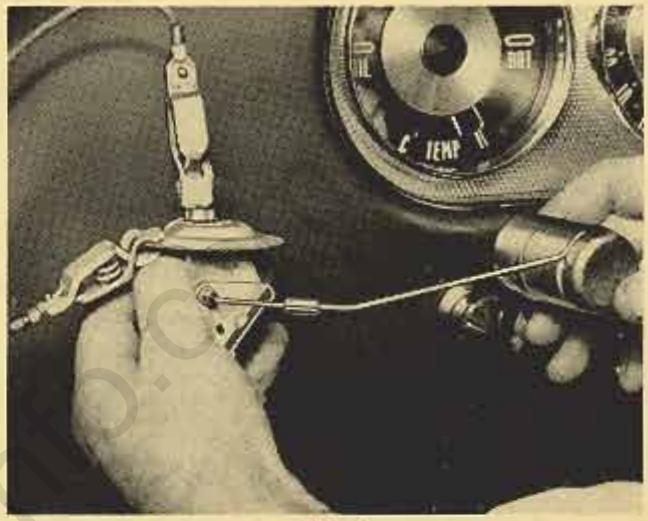

Fig. 3

When the float is at the bottom or empty position, the temperature gauge should register at the "C" marking on the dial (figure 2). When the float is moved upward to its top or full position, the gauge pointer should come to rest at the "H" marking on the dial (figure 3).

If the gauge checks O.K., the sending unit to gauge wire is O.K. also. If the gauge does not check O.K., disconnect the sending unit to gauge wire at the gauge and hook up the new tank unit to the terminal on the gauge. Repeat the empty and full checks. If the gauge operates properly, the sending unit to gauge wire should be replaced.

If the gauge operated properly with the new tank unit and the original wire, the sending unit in the cylinder head should be replaced.

The fuel gauge and the tank sending unit also may be checked following this procedure. Be sure that the tank unit is tight and properly grounded in the tank and that the tank is grounded to the frame.

Converter Inlet Pressure

23rd and 24th Series

Ultramatic Drive units in 24th and late 23rd Series vehicles have the die cast control assembly, part number 423000, which incorporates a late design converter relief valve.

When making pressure tests on these units, all gauge readings should be the same as on those units with the earlier control assemblies with the exception of the converter inlet pressure when operating with the selector lever in the reverse position. The gauge will show a pressure of 20 to 35 P.S.I. on the late units whereas this pressure will be 140 to 160 P.S.I. on the earlier units.

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